



US009679897B1

(12) **United States Patent**  
**Cao et al.**

(10) **Patent No.:** **US 9,679,897 B1**  
(45) **Date of Patent:** **Jun. 13, 2017**

(54) **HIGH DENSITY NANOFLUIDIC  
STRUCTURE WITH PRECISELY  
CONTROLLED NANO-CHANNEL  
DIMENSIONS**

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(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/090,423**

(22) Filed: **Apr. 4, 2016**

(51) **Int. Cl.**  
**H01L 27/088** (2006.01)  
**H01L 29/06** (2006.01)  
(Continued)

(52) **U.S. Cl.**  
CPC .... **H01L 27/0886** (2013.01); **B01L 3/502707**  
(2013.01); **B01L 3/502715** (2013.01); **H01L**  
**21/02532** (2013.01); **H01L 21/30604**  
(2013.01); **H01L 21/31111** (2013.01); **H01L**  
**21/56** (2013.01); **H01L 21/76224** (2013.01);  
**H01L 21/823431** (2013.01); **H01L 21/823481**  
(2013.01); **H01L 27/0203** (2013.01); **H01L**  
**29/0649** (2013.01); **B01L 2200/10** (2013.01);  
**B01L 2200/12** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
CPC ..... H01L 29/66795; H01L 29/785; H01L  
29/66545; H01L 29/165  
See application file for complete search history.

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(57) **ABSTRACT**

A nanofluidic structure including a semiconductor substrate  
and a dielectric layer positioned above and in contact with  
the semiconductor substrate. A first reservoir and a second  
reservoir are defined by the semiconductor substrate and the  
dielectric layer. The second reservoir is spaced apart from  
the first reservoir. Bottom passage fins protrude from the  
semiconductor substrate and extend from the first reservoir  
to the second reservoir. Top passage fins, above and spaced  
apart from the bottom passage fins, extend from the first  
reservoir to the second reservoir. Nanofluidic passages  
between the top and bottom fins connect the first reservoir  
and the second reservoir. Each of the nanofluidic passages  
includes a bottom wall, a top wall and sidewalls. The bottom  
wall is defined by a respective bottom passage fin. The top  
wall is defined by a respective top passage fin. The sidewalls  
are defined by the dielectric layer.

**18 Claims, 16 Drawing Sheets**

